CLAIMS

What is claimed is:

1. A filter comprising:

a capacitor and resistor in a series-feedback path; and

a transconductor to sense a voltage across the resistor to either source or sink additional current proportional to the voltage.

2. The filter of claim 1 wherein the transconductor and the capacitor are to provide a larger capacitance than the capacitor alone.

3. The filter of claim 2 further comprising an amplifier to receive pulses, wherein the capacitor and resistor are in the series-feedback path of the amplifier, and

wherein the filter is to integrate the pulses and generate a control voltage related to a width of the pulses.

4. The filter of claim 3 wherein the resistor is to provide a zero for the loop filter, and wherein the larger capacitance is to provide a pole for the filter.

5. The filter of claim 4 further comprising a second capacitor in a parallel feedback path of the amplifier, wherein the second capacitor is to provide an additional pole of the filter.

6. The filter of claim 5 wherein a frequency of the additional pole is greater than a frequency of the pole provided by the larger capacitance, and

wherein the first and second capacitors have approximately the same capacitance value.

7. The filter of claim 2 wherein the filter is a loop filter for a frequency synthesizer, and

wherein the loop filter is to generate a control voltage for a voltage-controlled oscillator.

8. The filter of claim 3 wherein the filter is a loop filter for a frequency synthesizer, wherein the amplifier is to provide a control voltage for a voltage-controlled oscillator,

wherein the amplifier is to receive pulses of varying width from a charge pump, and

wherein a width of the pulses is approximately proportional to an offset of the voltage-controlled oscillator.

9. The filter of claim 5 further comprising a filter network at an output of the amplifier to provide a higher frequency pole of the filter.

10. A filter comprising:

an operational amplifier; and

a current mirror in a feedback path of the amplifier to either source or sink additional current proportional to current through a feedback path capacitor,

wherein the current mirror and the capacitor provide a larger capacitance than the feedback path capacitor alone.

11. The filter of claim 10 wherein a series-feedback path comprises the feedback path capacitor and a resistor in series,

wherein the current mirror is part of a transconductor to sense a voltage across the resistor, and

wherein transconductor is to either source or sink the additional current proportional to the sensed voltage.

12. The filter of claim 11 wherein the operational amplifier is coupled to a reference voltage and is to receive pulses of varying width from a charge pump, and

wherein the filter is to integrate the pulses and generate a control voltage related to the width of the pulses.

13. The filter of claim 11 further comprising a second capacitor in a parallel feedback path of the amplifier,

wherein the resistor is to provide a zero for the filter, wherein the larger capacitance is to provide a pole for the filter,

wherein the second capacitor is to provide an additional pole of the filter, and

wherein a frequency of the additional pole is greater than a frequency of the pole provided by the larger capacitance.

14. The filter of claim 13 wherein the first and second capacitors have approximately the same capacitance.

15. A method comprising:

receiving pulses with an operational amplifier having a capacitor and resistor in a series-feedback path of the amplifier;

sensing, with a transconductor, a voltage across the resistor to either source or sink additional current proportional to the voltage; and

providing a pole for the filter with a larger capacitance provided by operation of the transconductor in conjunction with the capacitor.

16. The method of claim 15 wherein receiving comprises receiving pulses of varying width, and wherein the method further comprises:

integrating the pulses to generate a control voltage related to the width of the pulses.

17. The method of claim 16 wherein receiving comprises receiving pulses from a charge pump,

wherein sensing comprises sensing the voltage across the resistor to either source or sink additional input current for the charge pump,

wherein the method further comprises providing the control voltage to a voltage-controlled oscillator, and

wherein the width of the pulses is related to an offset of the voltage-controlled oscillator.

18. A frequency synthesizer comprising:

a charge pump; and

a loop filter comprising a capacitor and resistor in a series-feedback path, and a transconductor to sense a voltage across the resistor to either source or sink additional input current for the charge pump proportional to the sensed voltage,

wherein the transconductor and the capacitor provide a larger capacitance than the capacitor alone.

19. The frequency synthesizer of claim 18 wherein the charge pump is to provide pulses of varying pulse width to the loop filter,

wherein the loop filter is to integrate the pulses to generate a control voltage related to the width of the pulses,

wherein the frequency synthesizer further comprises a voltage-controlled oscillator to receive the control voltage from the loop filter and to generate a frequency output, and

wherein the width of the pulses is related to an offset of the frequency output.

20. The frequency synthesizer of claim 19 wherein the loop filter further comprises an operational amplifier coupled to a reference voltage to receive the pulses from the charge pump, and wherein the capacitor and resistor are in the series-feedback path of the amplifier.

21. The frequency synthesizer of claim 20 wherein the resistor is to provide a zero for the loop filter, wherein the larger capacitance is to provide a pole for the filter,

wherein the loop filter further comprises a second capacitor in a second feedback path of the amplifier,

wherein the second capacitor is to provide an additional pole of the filter, and

wherein a frequency of the additional pole is greater than a frequency of the pole provided by the larger capacitance.

22. The frequency synthesizer of claim 20 wherein the frequency synthesizer is a fractional-N frequency synthesizer,

wherein the frequency synthesizer further comprises divide by fractional N circuitry to receive the frequency output from the voltage-controlled oscillator and divide the frequency output by a non-integer value, and

wherein N is a positive odd integer.

23. The frequency synthesizer of claim 20 further comprising divide by N circuitry to receive the frequency output from the voltage-controlled oscillator and divide the frequency output by N, wherein N is a positive even integer.

24. A wireless communication device comprising:

a frequency synthesizer to generate a reference frequency; and

a transceiver to process received radio-frequency signals using the reference frequency,

wherein the frequency synthesizer comprises a charge pump and a loop filter, the loop filter comprising a capacitor and resistor in a series-feedback path, and a transconductor to sense a voltage across the resistor to either source or sink additional input current for the charge pump proportional to the sensed voltage, and

wherein the transconductor and the capacitor are to provide a larger capacitance than the capacitor alone.

25. The device of claim 24 wherein the charge pump is to provide pulses of varying pulse width to the loop filter, and wherein the loop filter is to integrate the pulses to generate a control voltage related to the width of the pulses,

wherein the frequency synthesizer further comprises a voltage-controlled oscillator to receive the control voltage from the loop filter and to generate a frequency output, wherein the width of the pulses is related to an offset of the frequency output, and

wherein the loop filter further comprises an operational amplifier referenced to a reference voltage to receive the pulses from the charge pump, and

wherein the capacitor and resistor are in the series-feedback path of the amplifier.

26. The device of claim 24 wherein the transceiver comprises a direct down conversion receiver, and wherein the reference frequency comprises a radio frequency signal for converting received radio frequency signals to signals of substantially zero frequency.

27. The device of claim 24 wherein the transceiver comprises a superheterodyne receiver and wherein the reference frequency is a local-oscillator frequency to down-convert a received radio frequency signal to one or more intermediate frequency signals.

28. The device of claim 24 wherein the transceiver comprises a polar transmitter to generate a phase component from the reference frequency, the phase component to be used to generate a polar-modulated radio frequency signal to transmit a code-division multiplexed communication signal.

29. The device of claim 24 wherein the transceiver comprises a digital transceiver to transmit phase modulated signals using a phase reference generated from the reference frequency.

30. A system comprising:

a substantially omnidirectional antenna to receive radio frequency signals;

a frequency synthesizer to generate a reference frequency; and

a transceiver to either downconvert or upconvert the received signals using the reference frequency,

wherein the frequency synthesizer comprises a charge pump and a loop filter, the loop filter comprising a capacitor and resistor in a series-feedback path, and a transconductor to sense a voltage across the resistor to either source or sink additional input current for the charge pump proportional to the sensed voltage, and

wherein the transconductor and the capacitor are to function as a larger capacitance than the capacitor alone.

31. The system of claim 30 wherein the charge pump is to provide pulses of varying pulse width to the loop filter, and wherein the loop filter is to integrate the pulses to generate a control voltage related to the width of the pulses.

32. The system of claim 31 wherein the frequency synthesizer further comprises a voltage-controlled oscillator to receive the control voltage from the loop filter and to generate a frequency output, wherein the width of the pulses is related to an offset of the frequency output, and

wherein the loop filter further comprises an operational amplifier referenced to a reference voltage to receive the pulses from the charge pump, and wherein the capacitor and resistor are in the series-feedback path of the amplifier.

33. An article comprising a storage medium having stored thereon instructions, that when executed by a computing platform, result in:

sensing a voltage across a resistor to either source or sink additional current proportional to the voltage in response to received pulses; and

providing a pole for a filter with a larger capacitance than a capacitor in series with the resistor.

34. The article of claim 33 wherein the instructions, when further executed by the computing platform result in integrating the pulses to generate a control voltage related to the width of the pulses.

35. The article of claim 34 wherein sensing comprises sensing the voltage across the resistor to either source or sink additional input current for a charge pump, and

wherein the instructions, when further executed by the computing platform result in providing the control voltage to a voltage-controlled oscillator,

wherein the width of the pulses is related to an offset of a voltage-controlled oscillator.